

estimate 9.5 dBk (32-QAM) and 5.5 dBk (16-QAM) as compared to NTSC at 25 dBk. We do not expect that unusual characteristics will be required.

2. The signal form anticipated by our prototype system is (787.5/1:1) at 59.94 Hz rate. The prototype system incorporates only a part of our proposal for the standard. Our proposal can accept essentially any signal format through source adaptivity. Our proposed system can also be used as a production standard by simply increasing the allocated bit rate. At 180 Mbits/sec, the processed video will be indistinguishable from the original for a video format of 720 x 1280 pixels/frame at 60 frames/sec rate.
3. Both satellite and fiber optic transmission can be used for our system. QPSK modulation will be used for satellite. Fiber optic and coaxial transmission will be tested by CableLabs during the ATTC testing.
4. Cutting and keying into the signal and full image manipulation can be accomplished by first decoding the signal.
5. We have not yet tested this experimentally. When the prototype system is built, this will be tested.
6. Yes, the required bandwidth is approximately 9 MHz.
7. Contribution circuits may use the same signal format as the broadcast link, although a higher data rate is useful if the signal is to be further processed. Other signal formats are also acceptable. Production quality after multiple encoding/decoding operations has not yet been experimentally tested. It is expected to depend strongly on the rate.

Cable

1. Decoding is not required for conditional-access data (or, for that matter, auxiliary data or audio data.) Such operations are very simple, given the digital time-division-multiplexed nature of the signal.
2. See 2-5 above.

Common Carrier

1. The baseband digital signal can be easily multiplexed onto common-carrier links.
2. Bit rate depends on the application and the quality desired. Any of the digital hierarchies supplies rates that seem to be appropriate.
3. Our system operates over a wide range of error rates. Typical "transparent" error rates, for unnoticeably small distortion, might be 10^{-9} for distribution and 10^{-11} for production, although much higher error rates can be tolerated.

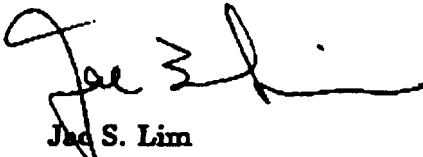
Consumer

1. Our signal may be directly recorded in digital format. Current VCR features are possible, although very flexible control (i.e. arbitrary-rate, undegraded fast-forward and rewind) may require a higher data rate and a less recursive format.

Satellite

1. Yes; specific multiples depend on the modulation and bandwidth chosen, but a single transponder might be expected to carry ~50 Mb/s, which yields two HDTV signals or one HDTV signal and several NTSC signals.
2. See 3 and 6 above.

Sincerely,



Joe S. Lim
Director of Advanced Television
Research Program

IS/WP2-0184
25 MAR 92

**FCC Advisory Committee on Advanced Television Service
Implementation Subcommittee Working Party 2 on Transition Scenarios**

March 17, 1992

Dr. Keiichi Kubota, Senior Scientist
NHK General Bureau for America
1 Rockefeller Plaza
Rm 1430
New York, NY 10020

Dear Dr. Kubota:

Further to your response to the questions previously posed to proponents by IS/WP-2, the Working Party has reviewed the material you supplied. It has now developed a series of follow-up questions specific to your initial responses regarding Narrow MUSE. Those follow-up questions are attached.

It is the intention of the Working Party to ask you to respond to these follow-up questions at the meeting to be held with proponents jointly by IS/WP-2, SS/WP-3, and PS/WP-5 next week. The exact structure of the meetings will be forwarded to you shortly, but the plan is to deal with the IS/WP-2 issues, such as the enclosed questions, during the first day of the joint meeting, that is on Wednesday, March 25.

In addition to these questions, there will also be a simplified system block diagram of a television station sent to you in the next day or so that you will be asked to comment upon. In particular, you will be asked to identify the type of signal form you expect to appear at each of the interconnections within that system.

As always, if you have any questions about the material being sent you by IS/WP-2 or should you need to discuss the plans for the upcoming meeting, please do call me. You can reach me at: (908) 906-0907.

Very truly yours,

/s/ S. Merrill Weiss

S. Merrill Weiss, Acting Chairman
Implementation Subcommittee Working Party 2 on Transition Scenarios

Attachment

IS/WP-2 Follow-up Questions Regarding Narrow MUSE

General

1. Regarding answer 1): What provision will you make in the initial implementation to make the use of additional motion vectors possible? What will receivers have to include? What if anything do you give up to add the motion vectors?

Regarding answer 2): What will a Narrow MUSE receiver have to do or have programmed from the beginning to receive a full band MUSE signal?

2. We take this answer to mean that the manufacturing information will be available during the period of generation of the NPRM. Do you agree?
3. Does this answer mean that to obtain any information at all about the system the terms and conditions must be agreed to? Or does this only apply to patent licensing and the transfer of manufacturing know-how? Do you plan to offer prototype hardware evaluation service?
4. Would the use of Full MUSE IC's in a Narrow MUSE encoder or decoder come at a cost penalty relative to specific Narrow MUSE chips? Would Narrow MUSE chips be more or less expensive than Full MUSE chips? Are there plans to develop specific Narrow MUSE IC's?
5. Does this answer mean that only the implementation of the broadcast transmitter facility is on the critical path? Does the 3 year period include the time for alternate media?

Broadcast

1. Your response indicates an expected improvement of 4-7 dB in receiver noise figure. What is your assumption about the noise figure of current receivers?
2. When you suggest upconverting only encoded NTSC as the alternative to full HDTV, do you preclude the use of a widescreen 525-line signal as a source? What production equipment economies could be available specifically for transmission in Narrow MUSE as opposed to the high quality inputs needed for Full MUSE? When could such equipment be available? Why would a broadcaster want to upgrade to true HDTV when a lower performance system might be adequate for Narrow MUSE?

Do you anticipate the use of compression of HDTV sources in the studio? What bit rate will be required for high quality production and post production using compression?

3. In the second option in your answer, where Narrow MUSE is transmitted digitally, what source is used for the further compression to 40 Mb/s?
4. In the case of distribution of a digitally compressed 240M signal, must the signal be fully decoded to permit the three production processes? Or is production done in the compressed domain?
5. How many times can the three processes be applied if the distribution signal is Narrow MUSE and it is decoded?
6. What would you recommend for carrying both signals in a 25 MHz channel?
7. Are these bit rates required only because of the use of true HDTV sources? Would lower performance sources permit lower bit rates with adequate quality in post production?

Cable

1. Is the hardware described (one-rack encoder, six-chip decoder) needed in addition to the Narrow MUSE encoder and decoder hardware in order to provide conditional access?

Consumer

1. What is the effect of motion compensation in Narrow MUSE on the ability to provide stunt features in the VCR's, both analog and digital, for example slow motion, still frame, reverse motion, picture in shuttle? Have you verified this experimentally?

Satellite

1. What modulation technique is assumed for carrying the digital signals on satellites? QPSK as shown for broadcast microwave?

**FCC Advisory Committee on Advanced Television Service
Implementation Subcommittee Working Party 2 on Transition Scenarios**

March 17, 1992

Dr. Jerrold Heller
VideoCipher Division
General Instrument Corporation
6262 Lusk Boulevard
San Diego, CA 92121

Dear Dr. Heller:

Further to your response to the questions previously posed to proponents by IS/WP-2, the Working Party has reviewed the material you supplied. It has now developed a series of follow-up questions specific to your initial responses regarding DigiCipher. Those follow-up questions are attached.

It is the intention of the Working Party to ask you to respond to these follow-up questions at the meeting to be held with proponents jointly by IS/WP-2, SS/WP-3, and PS/WP-5 next week. The exact structure of the meetings will be forwarded to you shortly, but the plan is to deal with the IS/WP-2 issues, such as the enclosed questions, during the first day of the joint meeting, that is on Wednesday, March 25.

In addition to these questions, there will also be a simplified system block diagram of a television station sent to you in the next day or so that you will be asked to comment upon. In particular, you will be asked to identify the type of signal form you expect to appear at each of the interconnections within that system.

As always, if you have any questions about the material being sent you by IS/WP-2 or should you need to discuss the plans for the upcoming meeting, please do call me. You can reach me at: (908) 906-0907.

Very truly yours,

/s/ S. Merrill Weiss

S. Merrill Weiss, Acting Chairman
Implementation Subcommittee Working Party 2 on Transition Scenarios

Attachment

IS/WP-2 Follow-up Questions Regarding DigiCipher

General

1. Are the protocols and data structures proprietary or do they conform to some industry standard? If not a standard, what would it take to adapt such a standard for use within the DigiCipher structure? If such an adaptation is not possible, what provision is there for incorporating data from other services? How difficult would it be to change the data type indicators to conform with an industry standard if one were available?

What will a DigiCipher receiver have to do or have programmed from the beginning in order to handle the extended performance?

2. Please differentiate between the availability of information for setting standards and information for design and manufacture. When will the complete information packages be available?
3. We take your answer to mean that no specific plan has yet been developed for the technology transfer. When in the process do you feel it will be appropriate to have such a plan? What will be included in such a plan?
4. When does the quoted 18-24 month period begin? At the time of an Advisory Committee recommendation? At the time of a Notice of Proposed Rulemaking? At the time of a Report and Order?
5. What is your definition of introduction? Please reconcile introduction within one year with the 18-24 month lead time for IC availability given in answer 4. You have made no comments regarding our PERT and Gantt charts. Please reconcile introduction with the construction of transmission facilities given in the PERT/Gantt charts. Please reconcile introduction with the availability of receiver production given in the PERT/Gantt charts.

Broadcast

1. No further questions.
2. Do you anticipate the use of compression of HDTV sources in the studio? What bit rate will be required for high quality production and post production using such compression?
3. Please reconcile your answers to questions B.3 and B.5. What compression level do you anticipate being used for distribution to affiliates and/or headends? Will it be fully compressed DigiCipher or something else with less compression?

Please specify the data rate that would be used. Does the compression anticipated use inter-field processing?

4. What level of compression of the distributed signal does this answer depend upon? If partial decoding is possible, how complex is it? How many times can it be done? What is required to make partial decoding possible?

What would happen if your fully-compressed signal were cut to another source? Is there any particular image characteristic that would make such a cut more acceptable than cutting other images? Is there any advantage to cutting the signal at a particular point in the frame sequence?

5. No further questions.
6. Does this answer apply to a TDM combination of an HDTV signal and a compressed digital NTSC signal applied to the 32-QAM modulation? Is 32-QAM appropriate for microwave use as opposed to QPSK?
7. Please expand this answer. Higher rate transmission is not fully described in the answers to B.3-B.5.

Cable

1. What is the mechanism by which the picture is scrambled? Can this be done only at the source or can it be done downstream? How complex is it to do? Is it correct to assume that channel synchronization and data stripping can be accomplished at all times, even with a scrambled picture?
2. No further questions.
3. No further questions.
4. No further questions.

Common Carrier

1. No further questions.
2. No further questions.
3. What do one uncorrectable error in 10 minutes and in one hour correspond to in terms of raw error rate?

Consumer

1. Are the VCR features available when directly recording a fully-compressed DigiCipher signal? Please comment further on the use of the fully-compressed signal in consumer VCR's. Which features might not be possible? Which ones do you believe will be possible? Regarding speed search functions in both directions, do you expect any limitations in the speeds at which they can be performed? How are all the features maintained in an environment of inter-field processing?

Satellite

1. No further questions.
2. No further questions.
3. No further questions.

**FCC Advisory Committee on Advanced Television Service
Implementation Subcommittee Working Party 2 on Transition Scenarios**

March 17, 1992

**Mr. Wayne Luplow, Executive Director
Electronic Systems Research & Development
Zenith Electronics Corporation
1000 Milwaukee Avenue
Room 690
Glenview, IL 60025-2493**

Dear Mr. Luplow:

Further to your response to the questions previously posed to proponents by IS/WP-2, the Working Party has reviewed the material you supplied. It has now developed a series of follow-up questions specific to your initial responses regarding DSC-HDTV. Those follow-up questions are attached.

It is the intention of the Working Party to ask you to respond to these follow-up questions at the meeting to be held with proponents jointly by IS/WP-2, SS/WP-3, and PS/WP-5 next week. The exact structure of the meetings will be forwarded to you shortly, but the plan is to deal with the IS/WP-2 issues, such as the enclosed questions, during the first day of the joint meeting, that is on Wednesday, March 25.

In addition to these questions, there will also be a simplified system block diagram of a television station sent to you in the next day or so that you will be asked to comment upon. In particular, you will be asked to identify the type of signal form you expect to appear at each of the interconnections within that system.

As always, if you have any questions about the material being sent you by IS/WP-2 or should you need to discuss the plans for the upcoming meeting, please do call me. You can reach me at: (908) 906-0907.

Very truly yours,

/s/ S. Merrill Weiss

**S. Merrill Weiss, Acting Chairman
Implementation Subcommittee Working Party 2 on Transition Scenarios**

Attachment

IS/WP-2 Follow-up Questions Regarding DSC-HDTV

General

1. Are the protocols and data structures proprietary or do they conform to some industry standard? If not a standard, what would it take to adapt such a standard for use within the DSC-HDTV structure? If such an adaptation is not possible, what provision is there for incorporating data from other services? How difficult would it be to change the data type indicators to conform with an industry standard if one were available?

What will a DSC-HDTV receiver have to do or have programmed from the beginning in order to handle the extended performance?

2. We interpret this answer to mean that technical information sufficient to begin the writing of standards will be available in the same 3 months needed to have technical information for manufacturing available and that the remaining time in the 6-month period is for the setting of the standards. Is this correct?
3. We take your answer to mean that no specific plan has yet been developed for the technology transfer. When in the process do you feel it will be appropriate to have such a plan? What will be included in such a plan?
4. How long following the unambiguous selection described in your answer to question G.5 will the IC's be made available to other manufacturers?
5. What will constitute, in your estimation, an unambiguous selection of your system? Please provide your estimate of the timing to marketplace introduction.

Broadcast

1. No further questions.
2. Would the compression system mentioned in the reply to question B.7 also be applicable to studio production and post production? What quality would result from such use when compared to an uncompressed studio signal? If the use of the compression system in the reply to question B.7 is not appropriate in the studio, do you anticipate use of some other form of compression of HDTV sources in the studio? What bit rate will be required for high quality production and post production using compression?
3. No further questions.

4. What are the channel change artifacts that would result from cutting into the signal? How might they be ameliorated by cutting to black? Are there any other images that could be used for such transitions, e.g. a still? Is there any advantage to cutting the signal at a particular point in the frame sequence?
5. For processing, what characteristics of the image impact the resulting quality and how? What is the relationship between those characteristics and the degree of degradation? What is the dependence on source signals that causes the differences in multi-generation processing to which you refer?
6. Is the frequency multiplexing you describe in the analog baseband or in the RF spectrum? What is the modulation technique you assume in arriving at the bandwidths given? What bandwidth would you expect would be needed to carry the 30-36 Mb/s of a digital link? Using what modulation technique?
7. What would be the impact of decoding the 2-D compressed signal to digital components as opposed to analog? How many times could signals that remain in the digital domain pass through such compression/decompression? You seem to indicate that keying and image manipulation can be done on a 2-D compressed signal without decompressing it. Can you explain how?

Cable

1. Please define a stream-cipher process. What is the mechanism by which the picture is scrambled? Can this be done only at the source or can it be done downstream? How complex is it to do? Is it correct to assume that channel synchronization and data stripping can be accomplished at all times, even with a scrambled picture?
2. No further questions.
3. No further questions.
4. No further questions.
5. No further questions.

Common Carrier

1. No further questions.
2. No further questions.
3. No further questions.

Consumer

1. Which features might not be possible? Which ones will be possible? Regarding the speed search simulations, at what speed have they been done? In which direction(s)? How are these features maintained in an environment of inter-field processing?

**FCC Advisory Committee on Advanced Television Service
Implementation Subcommittee Working Party 2 on Transition Scenarios**

March 17, 1992

Dr. James E. Carnes, President
David Sarnoff Research Center
201 Washington Road
Princeton, NJ 08540-6449

Dear Dr. Carnes:

Further to your response to the questions previously posed to proponents by IS/WP-2, the Working Party has reviewed the material you supplied. It has now developed a series of follow-up questions specific to your initial responses regarding AD-HDTV. Those follow-up questions are attached.

It is the intention of the Working Party to ask you to respond to these follow-up questions at the meeting to be held with proponents jointly by IS/WP-2, SS/WP-3, and PS/WP-5 next week. The exact structure of the meetings will be forwarded to you shortly, but the plan is to deal with the IS/WP-2 issues, such as the enclosed questions, during the first day of the joint meeting, that is on Wednesday, March 25.

In addition to these questions, there will also be a simplified system block diagram of a television station sent to you in the next day or so that you will be asked to comment upon. In particular, you will be asked to identify the type of signal form you expect to appear at each of the interconnections within that system.

As always, if you have any questions about the material being sent you by IS/WP-2 or should you need to discuss the plans for the upcoming meeting, please do call me. You can reach me at: (908) 906-0907.

Very truly yours,

/s/ S. Merrill Weiss

S. Merrill Weiss, Acting Chairman
Implementation Subcommittee Working Party 2 on Transition Scenarios

Attachment

IS/WP-2 Follow-up Questions Regarding AD-HDTV

General

1. Do you plan to use any particular standard for selecting identification of service type bytes? If not, what provision is there for incorporating data from other services? How difficult would it be to change the service type indicator to conform with a standard if one were available?
2. What is your recommendation for a reasonable time value to attach to "as quickly as possible?" If there is a delay in the FCC decision point, what will happen to the timing of information availability relative to the decision?
3. We take your answer to mean that no specific plan has yet been developed for the technology transfer. When in the process do you feel it will be appropriate to have such a plan? What will be included in such a plan?
4. When do you anticipate IC's will be available in the open market for non-ATRC companies to begin manufacturing?
5. Given your plans for component and product design, how long after the Advisory Committee Final Report do you anticipate do you anticipate introduction of your system?

Broadcast

1. No further questions.
2. What performance trade-offs can be expected from compression to 216 Mb/s and how many times can such compression be withstood while still yielding an image adequate for production and post production processing?

Do you anticipate the use of compression of HDTV sources other than for recording in the studio? What bit rate will be required for high quality production and post production using compression?

3. Can you provide some indication of the kind of relationship required of the MPEG signals used for distribution and transmission? How many times can conversion between these two forms be done with adequate image quality?
4. We take your response to mean that cuts can be done to a spatially-compressed signal only. All other production processes and forms of compression will require full decoding. Is this correct?

How and where can one expect to find a signal with only modest spatial compression? Is the signal so described the same as the 216 Mb/s signal in the answer to B.2?

What would happen if your fully-compressed signal were cut to another source? Is there any particular image characteristic that would make such a cut more acceptable than cutting other images? Is there any advantage to cutting the signal at a particular point in the frame sequence?

5. Would the signals delivered to affiliates/headends require decoding for further processing at the local station? How many times can this be done?
6. In the analog approach, is the FDM applied in the baseband, combining both signals on a single carrier, or is it applied at RF, with the signals on separate carriers? What is the required bandwidth for both the digital and analog approaches?
7. What are the hardware implications of what you suggest? What kinds of translators/compressors/decompressors are required and where in the system? How many times can signals traverse these processes while maintaining acceptable quality?

Cable

1. How complex is the equipment to accomplish the functions you describe? What is the mechanism by which the picture is scrambled? Can this be done only at the source or can it be done downstream? How complex is it to do? Is it correct to assume that channel synchronization and data stripping can be accomplished at all times, even with a scrambled picture?
2. Will the signal form described permit local commercial insertion by cable systems? How is this accomplished and how complex is the equipment to do this? Your answer to question B.4 seems to indicate that full decoding will be required. Is this correct? If it is correct, how many times can this be done with acceptable quality? Please see follow-up question B.5.
- 3.-5. We assume your answers to B.3, B.4, and B.5 apply to cable as well. Please confirm this.

Common Carrier

1. Does this answer apply only to the fully-compressed 20 Mb/s signal? Are other structures required for high performance, lower-compression signals?
2. The answer seems to assume use of fully compressed signals everywhere. Is this your intent? If not, what data rates are required at various places in the

system, e.g. contribution, distribution, and transmission links? What capability is available at the receiving end of links with such data rates?

3. Please provide some indication of the order of magnitude of error that can be tolerated in each of the services described in your answer to the further questions regarding CC.2 above.

Consumer

1. Please comment further on the use of the fully-compressed signal in consumer VCR's. Which features might not be possible? Which ones do you believe will be possible? Regarding speed search functions in both directions, do you expect any limitations in the speeds at which they can be performed? How are all the features maintained in an environment of inter-field processing?

Satellite

1. Regarding answer a.: What transponder bandwidth is required for the 60 Mb/s digital signal described and what is the modulation technique?

Regarding answer b.: What is the FDM structure, RF or baseband, and what is the required transponder bandwidth? Has this been tried experimentally?

**FCC Advisory Committee on Advanced Television Service
Implementation Subcommittee Working Party 2 on Transition Scenarios**

March 17, 1992

Dr. Caaj Greebe
Philips Laboratories
345 Scarborough Road
Briarcliff Manor, NY 10510

Dear Dr. Greebe:

Further to your response to the questions previously posed to proponents by IS/WP-2, the Working Party has reviewed the material you supplied. It has now developed a series of follow-up questions specific to your initial responses regarding AD-HDTV. Those follow-up questions are attached.

It is the intention of the Working Party to ask you to respond to these follow-up questions at the meeting to be held with proponents jointly by IS/WP-2, SS/WP-3, and PS/WP-5 next week. The exact structure of the meetings will be forwarded to you shortly, but the plan is to deal with the IS/WP-2 issues, such as the enclosed questions, during the first day of the joint meeting, that is on Wednesday, March 25.

In addition to these questions, there will also be a simplified system block diagram of a television station sent to you in the next day or so that you will be asked to comment upon. In particular, you will be asked to identify the type of signal form you expect to appear at each of the interconnections within that system.

As always, if you have any questions about the material being sent you by IS/WP-2 or should you need to discuss the plans for the upcoming meeting, please do call me. You can reach me at: (908) 906-0907.

Very truly yours,

/s/ S. Merrill Weiss

S. Merrill Weiss, Acting Chairman
Implementation Subcommittee Working Party 2 on Transition Scenarios

Attachment

IS/WP-2 Follow-up Questions Regarding AD-HDTV

General

1. Do you plan to use any particular standard for selecting identification of service type bytes? If not, what provision is there for incorporating data from other services? How difficult would it be to change the service type indicator to conform with a standard if one were available?
2. What is your recommendation for a reasonable time value to attach to "as quickly as possible?" If there is a delay in the FCC decision point, what will happen to the timing of information availability relative to the decision?
3. We take your answer to mean that no specific plan has yet been developed for the technology transfer. When in the process do you feel it will be appropriate to have such a plan? What will be included in such a plan?
4. When do you anticipate IC's will be available in the open market for non-ATRC companies to begin manufacturing?
5. Given your plans for component and product design, how long after the Advisory Committee Final Report do you anticipate do you anticipate introduction of your system?

Broadcast

1. No further questions.
2. What performance trade-offs can be expected from compression to 216 Mb/s and how many times can such compression be withstood while still yielding an image adequate for production and post production processing?

Do you anticipate the use of compression of HDTV sources other than for recording in the studio? What bit rate will be required for high quality production and post production using compression?

3. Can you provide some indication of the kind of relationship required of the MPEG signals used for distribution and transmission? How many times can conversion between these two forms be done with adequate image quality?
4. We take your response to mean that cuts can be done to a spatially-compressed signal only. All other production processes and forms of compression will require full decoding. Is this correct?

How and where can one expect to find a signal with only modest spatial compression? Is the signal so described the same as the 216 Mb/s signal in the answer to B.2?

What would happen if your fully-compressed signal were cut to another source? Is there any particular image characteristic that would make such a cut more acceptable than cutting other images? Is there any advantage to cutting the signal at a particular point in the frame sequence?

5. Would the signals delivered to affiliates/headends require decoding for further processing at the local station? How many times can this be done?
6. In the analog approach, is the FDM applied in the baseband, combining both signals on a single carrier, or is it applied at RF, with the signals on separate carriers? What is the required bandwidth for both the digital and analog approaches?
7. What are the hardware implications of what you suggest? What kinds of translators/compressors/decompressors are required and where in the system? How many times can signals traverse these processes while maintaining acceptable quality?

Cable

1. How complex is the equipment to accomplish the functions you describe? What is the mechanism by which the picture is scrambled? Can this be done only at the source or can it be done downstream? How complex is it to do? Is it correct to assume that channel synchronization and data stripping can be accomplished at all times, even with a scrambled picture?
2. Will the signal form described permit local commercial insertion by cable systems? How is this accomplished and how complex is the equipment to do this? Your answer to question B.4 seems to indicate that full decoding will be required. Is this correct? If it is correct, how many times can this be done with acceptable quality? Please see follow-up question B.5.
- 3.-5. We assume your answers to B.3, B.4, and B.5 apply to cable as well. Please confirm this.

Common Carrier

1. Does this answer apply only to the fully-compressed 20 Mb/s signal? Are other structures required for high performance, lower-compression signals?
2. The answer seems to assume use of fully compressed signals everywhere. Is this your intent? If not, what data rates are required at various places in the

system, e.g. contribution, distribution, and transmission links? What capability is available at the receiving end of links with such data rates?

3. Please provide some indication of the order of magnitude of error that can be tolerated in each of the services described in your answer to the further questions regarding CC.2 above.

Consumer

1. Please comment further on the use of the fully-compressed signal in consumer VCR's. Which features might not be possible? Which ones do you believe will be possible? Regarding speed search functions in both directions, do you expect any limitations in the speeds at which they can be performed? How are all the features maintained in an environment of inter-field processing?

Satellite

1. Regarding answer a.: What transponder bandwidth is required for the 60 Mb/s digital signal described and what is the modulation technique?

Regarding answer b.: What is the FDM structure, RF or baseband, and what is the required transponder bandwidth? Has this been tried experimentally?